PATENT COOPERATION TREATY

PCT

INTERNATIONAL PRELIMINARY EXAMINATION REPORT

(PCT Article 36 and Rule 70)

Applicant's or agent's file reference 30829WOP00	**FOR FURTHER ACTION**	See Notification of Transmittal of International Preliminary Examination Report (Form PCT/IPEA/416).
International Application No. **PCT/AU2003/000086**	International Filing Date *(day/month/year)* 28 January 2003	Priority Date *(day/month/year)* 25 January 2002
International Patent Classification (IPC) or national classification and IPC **Int. Cl.** [7] C25C 7/02		
Applicant MOUNT ISA MINES LIMITED et al		

1. This international preliminary examination report has been prepared by this International Preliminary Examining Authority and is transmitted to the applicant according to Article 36.

2. This REPORT consists of a total of 3 sheets, including this cover sheet.

   [X] This report is also accompanied by ANNEXES, i.e., sheets of the description, claims and/or drawings which have been amended and are the basis for this report and/or sheets containing rectifications made before this Authority (see Rule 70.16 and Section 607 of the Administrative Instructions under the PCT).

   These annexes consist of a total of **6** sheet(s).

3. This report contains indications relating to the following items:

   - I [X] Basis of the report
   - II [ ] Priority
   - III [ ] Non-establishment of opinion with regard to novelty, inventive step and industrial applicability
   - IV [ ] Lack of unity of invention
   - V [X] Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement
   - VI [ ] Certain documents cited
   - VII [ ] Certain defects in the international application
   - VIII [ ] Certain observations on the international application

Date of submission of the demand 28 July 2003	Date of completion of the report 13 May 2004
Name and mailing address of the IPEA/AU AUSTRALIAN PATENT OFFICE PO BOX 200, WODEN ACT 2606, AUSTRALIA E-mail address: pct@ipaustralia.gov.au Facsimile No. (02) 6285 3929	Authorized Officer **R.P. ALLEN** Telephone No. (02) 6283 2134

INTERNATIONAL PRELIMINARY EXAMINATION REPORT

International application No.
PCT/AU2003/000086

I. **Basis of the report**

1. With regard to the **elements** of the international application:*

☐ the international application as originally filed.

☒ the description, pages **1, 4-5** as originally filed,
pages , filed with the demand,
pages **2, 3, 3a** received on **23 April 2004** with the letter of 23 April 2004

☒ the claims, pages , as originally filed,
pages , as amended (together with any statement) under Article 19,
pages , filed with the demand,
pages **6-8** received on **23 April 2004** with the letter of **23 April 2004**

☒ the drawings, pages **1-2** as originally filed,
pages , filed with the demand,
pages , received on with the letter of

☐ the sequence listing part of the description:
pages , as originally filed
pages , filed with the demand
pages , received on with the letter of

2. With regard to the **language**, all the elements marked above were available or furnished to this Authority in the language in which the international application was filed, unless otherwise indicated under this item.
These elements were available or furnished to this Authority in the following language which is:

☐ the language of a translation furnished for the purposes of international search (under Rule 23.1(b)).

☐ the language of publication of the international application (under Rule 48.3(b)).

☐ the language of the translation furnished for the purposes of international preliminary examination (under Rules 55.2 and/or 55.3).

3. With regard to any **nucleotide and/or amino acid sequence** disclosed in the international application, the international preliminary examination was carried out on the basis of the sequence listing:

☐ contained in the international application in written form.

☐ filed together with the international application in computer readable form.

☐ furnished subsequently to this Authority in written form.

☐ furnished subsequently to this Authority in computer readable form.

☐ The statement that the subsequently furnished written sequence listing does not go beyond the disclosure in the international application as filed has been furnished.

☐ The statement that the information recorded in computer readable form is identical to the written sequence listing has been furnished

4. ☐ The amendments have resulted in the cancellation of:

☐ the description, pages

☐ the claims, Nos.

☐ the drawings, sheets/fig.

5. ☐ This report has been established as if (some of) the amendments had not been made, since they have been considered to go beyond the disclosure as filed, as indicated in the Supplemental Box (Rule 70.2(c)).**

* *Replacement sheets which have been furnished to the receiving Office in response to an invitation under Article 14 are referred to in this report as "originally filed" and are not annexed to this report since they do not contain amendments (Rules 70.16 and 70.17).*

** *Any replacement sheet containing such amendments must be referred to under item 1 and annexed to this report*

V. Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement

1. Statement

Novelty (N)	Claims	1-26	YES
	Claims		NO
Inventive step (IS)	Claims	1-26	YES
	Claims		NO
Industrial applicability (IA)	Claims	1-26	YES
	Claims		NO

2. Citations and explanations (Rule 70.7)

Citations

(a) US 4186074 A (PERRY) 29 January 1980 See entire document

(b) Derwent Abstract Accession No.94-075737/10 , Class X25, DE 4241485 C (SIEMENS AG) 17 March 1993 & DE 4241485 See entire document

(c) US 4882027 A (BORST et al.) 21 November 1989

(d) Derwent Abstract Accession No. 93-262108/33, Class M28, JP 05-179478 A (SHINKO METAL PROD KK) 20 July 1993 & JP 05-179478 A See abstract and figures

(e) WO 2001/063013 A (OUTOKUMPU OYJ) 30 August 2001 See entire document

(f) WO 2000/039366 A (RSR TECHNOLOGIES INC) 6 July 2000 See entire document

(g) US 4373654 A (PRENGAMAN et al.) 15 February 1983 See entire document

Novelty & Inventive Step

Claims 1-26 None of the citations, or obvious combination thereof, disclose all of the features of any of these claims.

The cost, complexity and durability of the copper hanger bar led the industry to use iron or steel hanger bars for greater structural strength. In most cases, while structural integrity was good, the iron or stainless steel was a poor conductor of electricity. Accordingly, in another technique a coating of electrically conductive metal was electrolytically deposited on the hanger bar. Such iron or steel hanger bars with electrolytically deposited conductive metal, came in various shapes such as simple solid beams, I-beams or hollow sections.

Once again, however, it was found that these new configurations had their own difficulties. Firstly, such a coating technique only permits tolerances within the technical limitation of the electroplating process. The thickness and adhesion of the metal coating is additionally limited by the electroplating process.

It is an object of the present invention to overcome or ameliorate at least one of the disadvantages of the prior art, or to provide a useful alternative.

Disclosure of the Invention

In a broad aspect, the present invention provides a cathode plate for electrolytic recovery of metal said plate including a cathode plate and a hanger bar, said hanger bar comprises a corrosion resistant support element connected to the blade of the cathode plate and an electrically conductive metal cladding affixed thereto, the electrically conductive metal cladding extending over at least a portion of the support element to the cathode blade and part way down the cathode blade.

The support element should be resistant to corrosion in the environment of use, ie in the electrolytic bath. Preferably, the corrosion resistant support element is made from stainless steel and is preferably hollow.

The electrically conductive metal cladding may be affixed to and cover a portion or the entire exterior of the stainless steel support. This is accomplished by any suitable technique eg an interference fit, welding, chemical or mechanical fastening, roll forming, etc.

The use of stainless steel as the support element imparts strength, long term durability and corrosion resistance for the hanger bar. These features are clearly important in obtaining an extended operational life for the hanger bar. However, as is well known in the art, stainless steel is a relatively poor electrical conductor. The introduction of an electrically conductive metal cladding will permit the ready transfer of electrical current along the hanger bar into the blade of the cathode plate.

However, unlike the prior art this electrical conductivity is achieved by affixing a cladding of electrically conductive material. Mechanically fitting the cladding permits a more precise engineering specification to be applied to the cladding thickness and consequently aids in the maintaining vertical alignment of the cathodes in the electrolytic cells. As discussed above, tolerances now required for operation of electrolytic cells at high current density cannot be easily achieved by other conventional mechanisms such as electroplating of the stainless steel hanger bar.

In addition, the necessary strength for the hanger bar cannot be obtained from the use of copper alloy within the hanger bar construction.

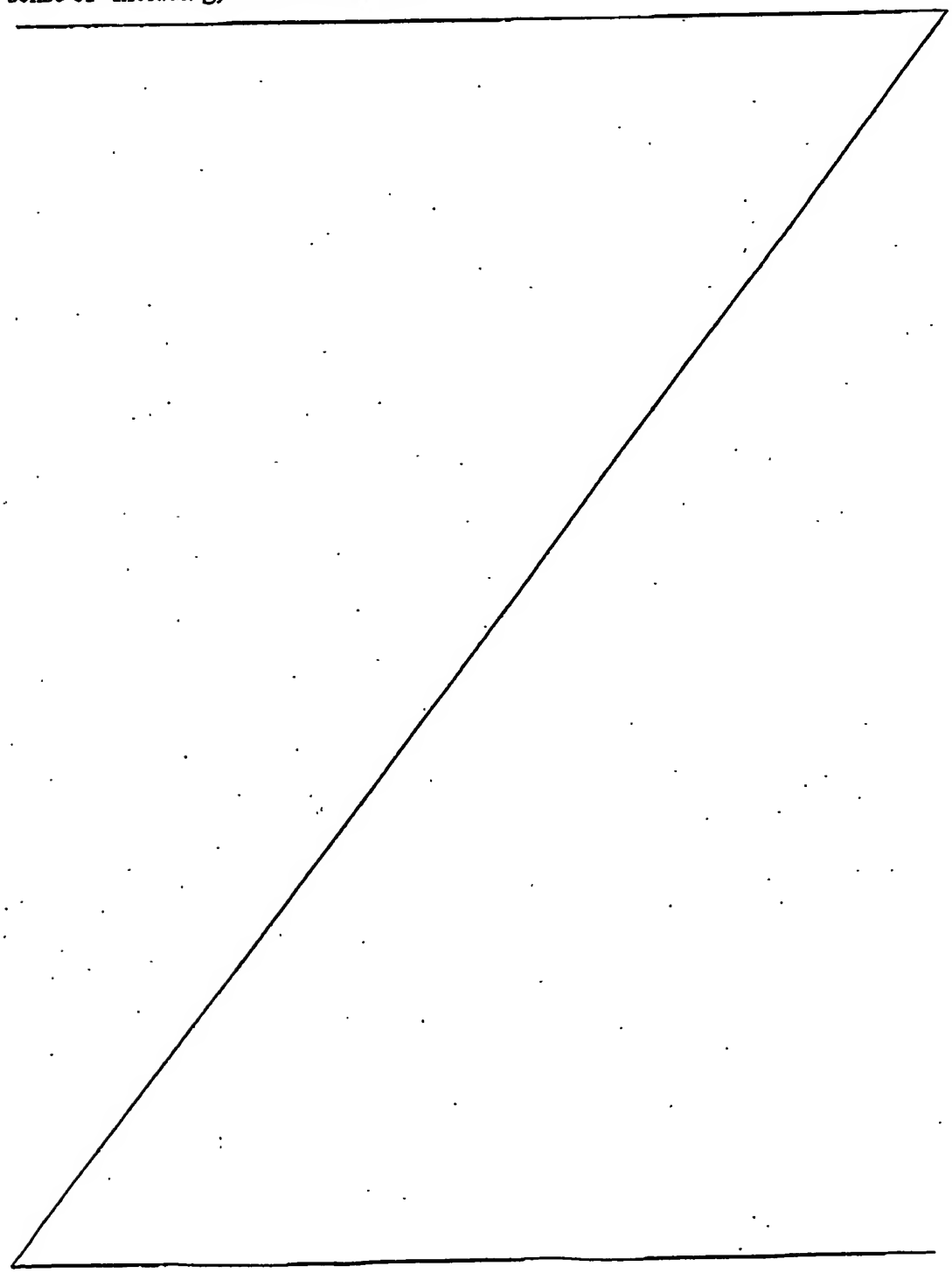
In a preferred embodiment, the electrically conductive cladding surrounds the exposed portions of the support element.

By extending the electrically conductive cladding part way down from the support element along the blade of the cathode, the electrical resistance to current passing through the bar onto the blade and in addition reduces the possibility of bi-metallic corrosion of the joint between the electrically conductive metal and the cathode blade which is normally made from stainless steel, is also reduced.

In addition to the aforementioned advantages arising from use of the hanger bar, the production of the hanger bar itself is much simpler that conventional mechanisms. For instance, it is not necessary to use a portion of the hanger bar as weld material. Nor is it necessary to electroplate the hanger bar. As will be known to persons skilled in the art, in one conventional technique, for production of the cathode plate, after the hanger bar is welded to the cathode blade, the entire assembly is inverted and dipped into an electrolytic bath a sufficient depth to electroplate the hanger bar with a conductive metal. The cost and handling difficulties associated with this mechanism are clear. Affixing a cladding of electrically conductive metal to the support element is much simpler, more cost effective and more accurate than current techniques.

In a second embodiment, the present invention provides a method of producing a cathode plate for electrolytic recovery of metal comprising a cathode blade, connecting a corrosion resistant support element to the cathode blade, said element being adapted to support the cathode plate in an electrolytic bath, and affixing a cladding of electrically conductive metal to the support wherein the electrically conductive metal cladding extends over at least a portion of the support element to the cathode blade and part way down the cathode blade.

Unless the context clearly requires otherwise, throughout the description and the claims, the words 'comprise', 'comprising', and the like are to be construed in an inclusive sense as opposed to an exclusive or exhaustive sense; that is to say, in the sense of "including, but not limited to".



CLAIMS:

1. A cathode plate for electrolytic recovery of metal said plate including a cathode plate and a hanger bar, said hanger bar comprises a corrosion resistant support element connected to the blade of the cathode plate and an electrically conductive metal cladding affixed thereto, the electrically conductive metal cladding extending over at least a portion of the support element to the cathode blade and part way down the cathode blade.

2. A cathode plate as claimed in claim 1, wherein the support element is constructed from stainless steel.

3. A cathode plate as claimed in claim 1, wherein said support element is hollow.

4. A cathode plate as claimed in claim 1 or claim 2, wherein the electrically conductive metal cladding is affixed such that it covers the entire exterior of the support element.

5. A cathode plate as claimed in any one of claims 1 to 4, wherein the electrically conductive metal cladding is affixed such that it covers a portion of the support element.

6. A cathode plate as claimed in any one of the preceding claims, wherein the electrically conductive metal cladding is affixed by an interference fit.

7. A cathode plate as claimed in any one of the preceding claims, wherein the electrically conductive metal cladding is affixed by welding.

8. A cathode plate as claimed in claim 7, wherein the electrically conductive metal cladding is welded to the support element and/or cathode blade by aluminium bronze weld.

9. A cathode plate as claimed in claim 7, wherein the electrically conductive metal cladding is welded to the support element and/or cathode blade by silicone bronze weld.

10. A hanger bar as claimed in any one of the preceding claims, wherein the electrically conductive metal cladding is affixed to the support element by mechanical and/or chemical fastening.

11. A cathode plate as claimed in any one of the preceding claims, wherein the support element and electrically conductive metal cladding are affixed by coextrusion.

12. A cathode plate as claimed in any one of the preceding claims, wherein the electrically conductive metal cladding is affixed to the support element by roll forming.

13. A cathode plate as claimed in claim 12, wherein the cladding extends from the support element to a position 30 to 40 mm above the metal deposition area on the cathode blade.

14. A hanger bar as claimed in any one of the preceding claims, wherein the blade is stainless steel.

15. A hanger bar as claimed in any one of the preceding claims, wherein the electrically conductive metal is copper.

16. A method of producing a cathode plate for electrolytic recovery of metal comprising a cathode blade, connecting a corrosion resistant support element to the cathode blade, said element being adapted to support the cathode plate in an electrolytic bath, and affixing a cladding of electrically conductive metal to the support wherein the electrically conductive metal cladding extends over at least a portion of the support element to the cathode blade and part way down the cathode blade.

17. A method as claimed in claim 16, wherein the cladding is affixed to the support element after connection of the support element and cathode blade.

18. A method as claimed in claim 16or claim 17, wherein the cladding is affixed to the support element before connection of the support element to the cathode blade.

19. A method as claimed in any one of claims 16to 18, wherein the electrically conductive metal cladding is affixed by an interference fit.

20. A method as claimed in any one of claims 16 to 19, wherein the electrically conductive metal cladding is affixed by welding.

21. A method as claimed in claim 20, wherein the electrically conductive metal cladding is welded to the support element and/or cathode blade by aluminium bronze weld.

22. A method as claimed in claim 20, wherein the electrically conductive metal cladding is welded to the support element and/or cathode plate by silicone bronze weld.

23. A method as claimed in any one of claims 15 to 20, wherein the electrically conductive metal cladding is affixed by chemical or mechanical fastening.

24. A method as claimed in any one of claims 15 to 22, wherein the support and electrically conductive metal cladding are affixed by roll forming.

25. A method as claimed in any one of claims 15 to 24, wherein the cathode blade and/or support element are constructed from stainless steel.

26. A method as claimed in any one of claims 15 to 25, wherein the electrically conductive metal is copper.